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7 August 1963

MEMORANDUM FOR: Assistant for Plans and Development

THROUGH : Chief, Development Branch, P&DS

SUBJECT : Recommended Study for Optimizing Photograph Materials and Processing Techniques for Use with Lasers

I. PROBLEM:

Lasers can produce ultra-high intensity, very narrow angle beams of coherent monochromatic light. Because of these unique properties, the laser theoretically appears ideally adapted for application to many areas relating to the photographic sciences.

NPIC has two current projects involving laser light sources. One of these projects is with [redacted] and involves the use of a laser as a coherent light source in a prototype ultra-high resolution optical enlarger. [redacted] is proposing a high resolution optical printer in which an ultra-fine spot size laser beam is electronically modulated and utilized in an optical scanning technique. Lasers look promising for many additional applications in the photographic field, however, laser beams also have limitations. One of these is that, unfortunately, while lasers do operate within the broad regions of the optical frequencies of the electromagnetic spectrum, all commercially available (non-pure research type) lasers operate from just inside the visible red range far down into the infra-red regions of the spectrum with gas lasers operating in wave lengths from 0.6 microns to 30 microns and solid lasers from 0.7 to 2.6 microns. A tremendous volume of research money is being expended on finding materials that will lase in the shorter wave lengths of both visible and ultra-violet light. However, there are strong indications that a major breakthrough is required to bring this to fruition and that for the present and near future we will have to live with the red and infra-red. It becomes obvious that if we are going to use lasers to expose photographic materials, that we are going to require a far more comprehensive knowledge of the effects of lasers on photographic materials and techniques.

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II. FACTS:

The following questions need timely comprehensive answers:

a. What is the effect of the lasers' heat on our high resolution, thin emulsion, thin based films? Will it effect the image or change it dimensionally? Will it change the plasticity of the film? Will laser exposed films deteriorate faster with age?

b. Are our present high resolution films responsive to light in the red and infra-red ranges? If so, do they retain the same resolution characteristics? If they do not, what films should we use to obtain high resolution? Are such films available or must they be developed?

c. What red or infra-red wave lengths or frequencies would prove optimum strictly from a photographic films and emulsions view point? This information is required in determining the type or types of lasers to be installed in our present and future equipment.

d. Will any photograph processing changes be required? If so, in what specific areas and is the equipment available?

e. Will it be necessary to view the laser illuminated image prior to exposure? If so, what would be the ideal system?

III. CONCLUSIONS:

1. A comprehensive timely study of the effects of exposing photography using a laser as a light source is urgently needed.

2. This study should cover both photograph materials and techniques and should answer all of the questions stated under Item II FACTS.

3. NPIC currently has a large open research contract with [redacted] 25X1
25X1 [redacted] It appears that this study could be ideally handled within the framework of this contract.

IV. RECOMMENDATIONS:

That P&DS write a Research Objective covering the subject study and that NPIC assign this study to [redacted] under contract [redacted] 25X1

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Development Branch, P&DS

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